FIG. 1

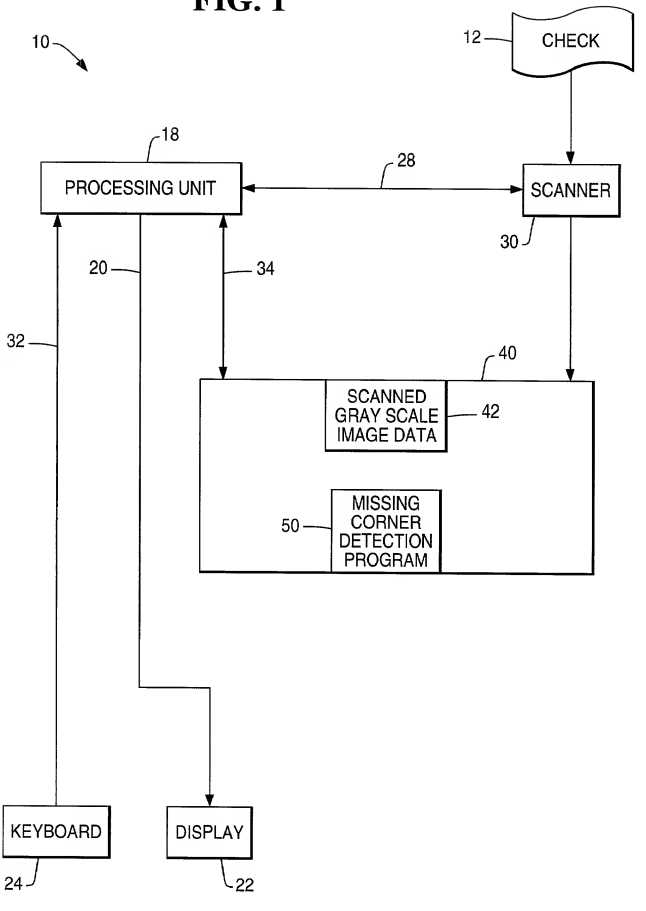

10
12
CHECK
18
PROCESSING UNIT
28
SCANNER
30
20
34
32
40
SCANNED GRAY SCALE IMAGE DATA
42
50
MISSING CORNER DETECTION PROGRAM
KEYBOARD
DISPLAY
24
22

FIG. 2

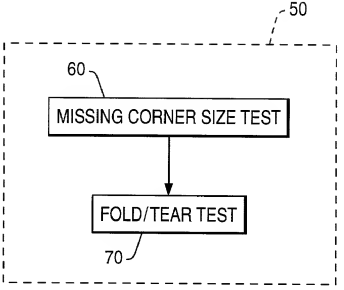
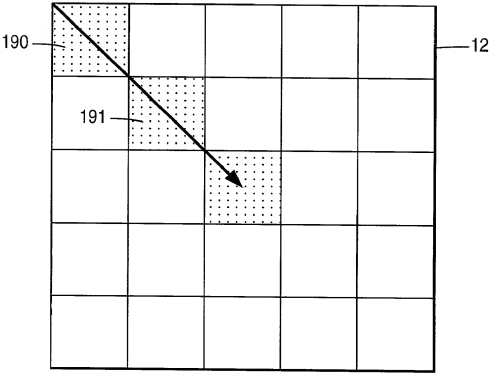


FIG. 4



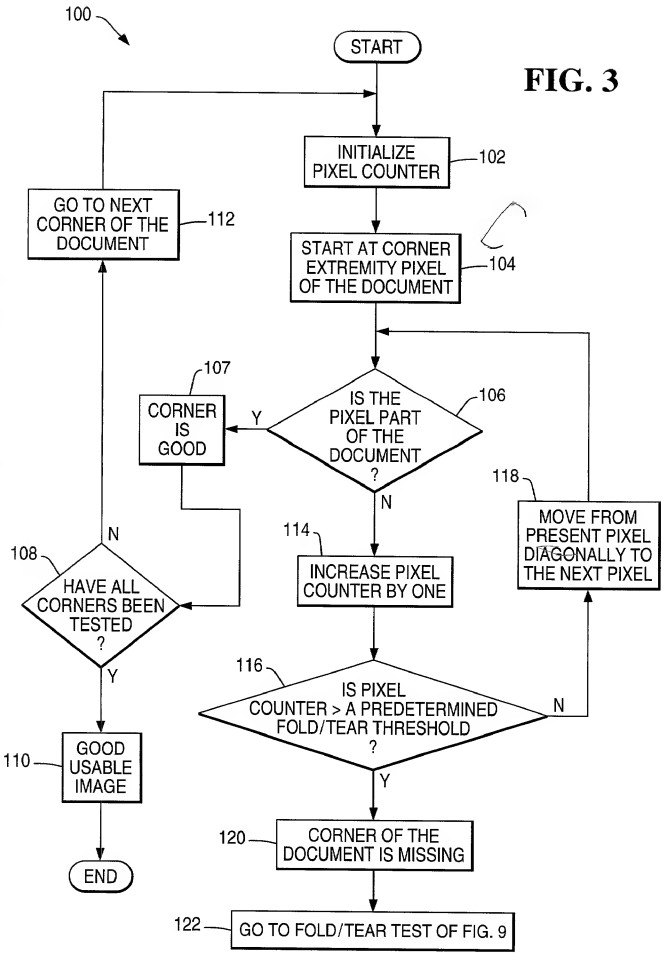

100
START
INITIALIZE PIXEL COUNTER
102
START AT CORNER EXTREMITY PIXEL OF THE DOCUMENT
104
IS THE PIXEL PART OF THE DOCUMENT ?
106
Y
CORNER IS GOOD
107
N
INCREASE PIXEL COUNTER BY ONE
114
IS PIXEL COUNTER > A PREDETERMINED FOLD/TEAR THRESHOLD ?
116
N
MOVE FROM PRESENT PIXEL DIAGONALLY TO THE NEXT PIXEL
118
Y
CORNER OF THE DOCUMENT IS MISSING
120
GO TO FOLD/TEAR TEST OF FIG. 9
122
HAVE ALL CORNERS BEEN TESTED ?
108
N
Y
GO TO NEXT CORNER OF THE DOCUMENT
112
GOOD USABLE IMAGE
110
END

FIG. 3

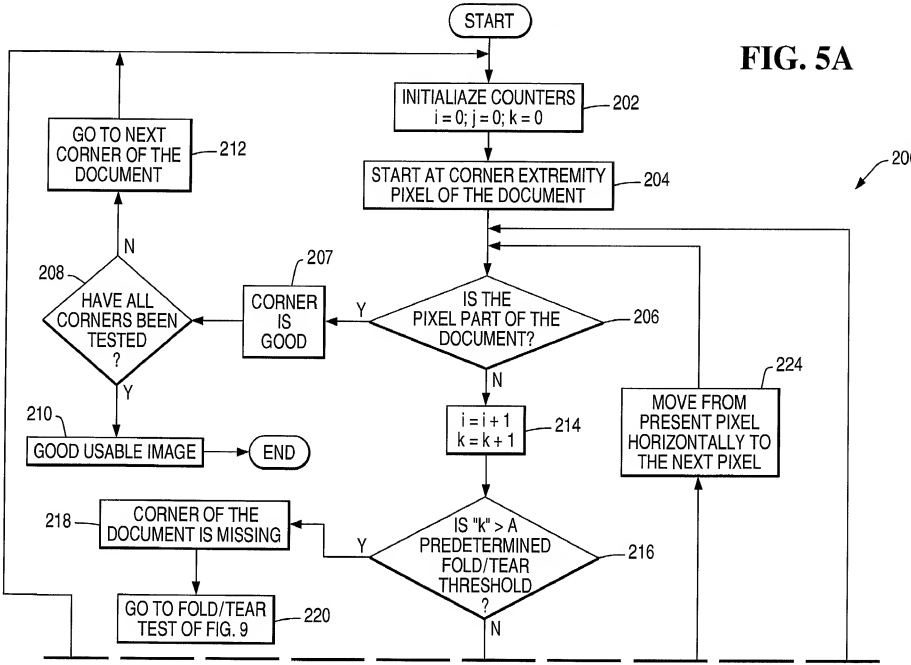

START
INITIALIAZE COUNTERS i = 0; j = 0; k = 0
202
START AT CORNER EXTREMITY PIXEL OF THE DOCUMENT
204
200
IS THE PIXEL PART OF THE DOCUMENT?
206
Y
N
CORNER IS GOOD
207
HAVE ALL CORNERS BEEN TESTED ?
208
N
Y
GO TO NEXT CORNER OF THE DOCUMENT
212
GOOD USABLE IMAGE
210
END
i = i + 1
k = k + 1
214
MOVE FROM PRESENT PIXEL HORIZONTALLY TO THE NEXT PIXEL
224
IS "k" > A PREDETERMINED FOLD/TEAR THRESHOLD ?
216
Y
N
CORNER OF THE DOCUMENT IS MISSING
218
GO TO FOLD/TEAR TEST OF FIG. 9
220

FIG. 5A

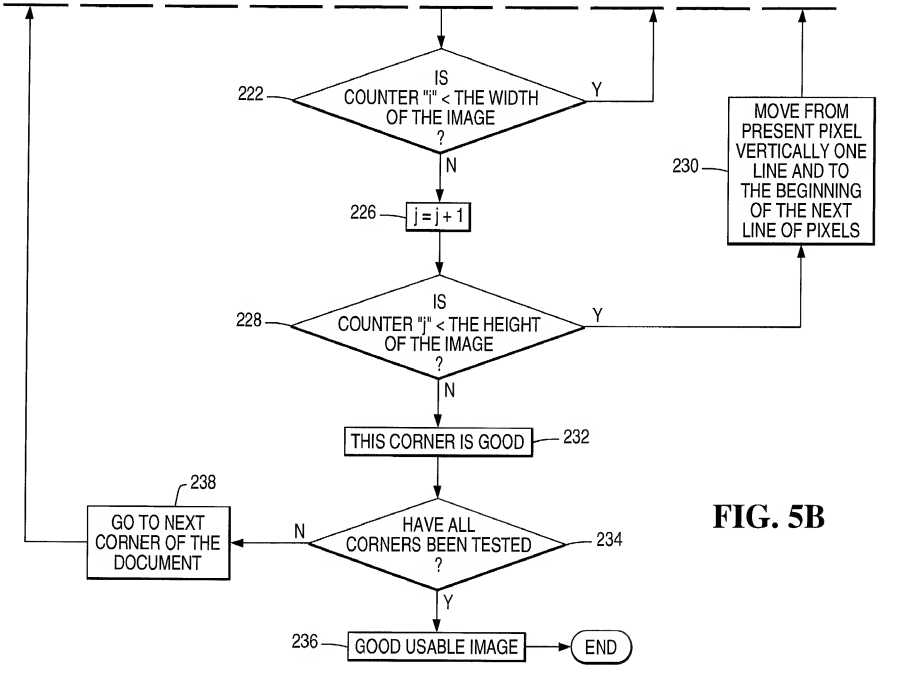
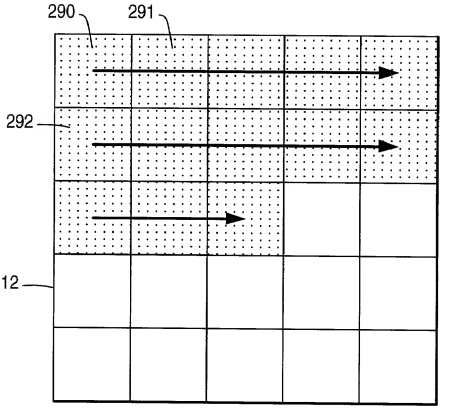

IS COUNTER "i" < THE WIDTH OF THE IMAGE ?
222
Y
N
MOVE FROM PRESENT PIXEL VERTICALLY ONE LINE AND TO THE BEGINNING OF THE NEXT LINE OF PIXELS
230
j = j + 1
226
IS COUNTER "j" < THE HEIGHT OF THE IMAGE ?
228
Y
N
THIS CORNER IS GOOD
232
238
GO TO NEXT CORNER OF THE DOCUMENT
N
HAVE ALL CORNERS BEEN TESTED ?
234
Y
236
GOOD USABLE IMAGE
END

FIG. 5B

FIG. 6



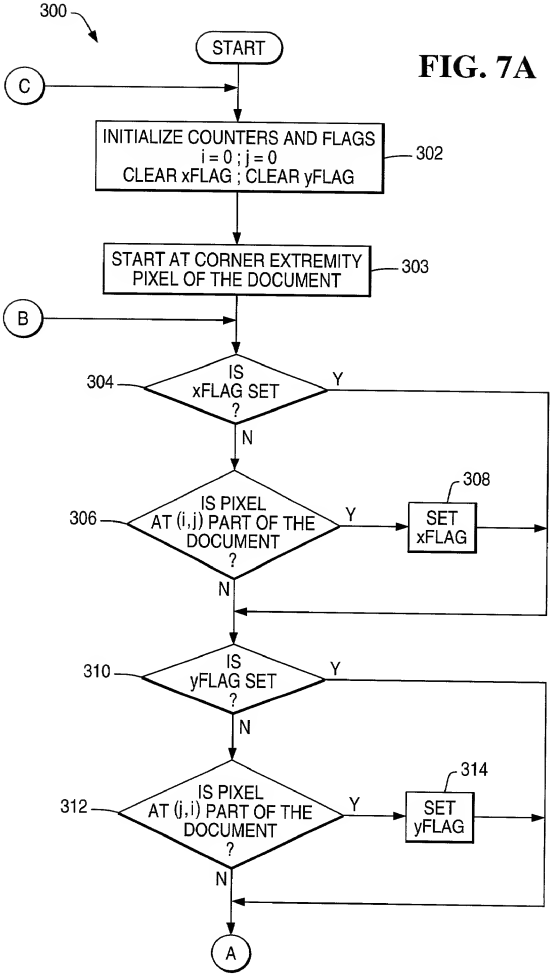

300
START
C
INITIALIZE COUNTERS AND FLAGS
i = 0 ; j = 0
CLEAR xFLAG ; CLEAR yFLAG
302
START AT CORNER EXTREMITY
PIXEL OF THE DOCUMENT
303
B
304
IS
xFLAG SET
?
Y
N
306
IS PIXEL
AT (i,j) PART OF THE
DOCUMENT
?
Y
308
SET
xFLAG
N
310
IS
yFLAG SET
?
Y
N
312
IS PIXEL
AT (j,i) PART OF THE
DOCUMENT
?
Y
314
SET
yFLAG
N
A

FIG. 7A

FIG. 7B

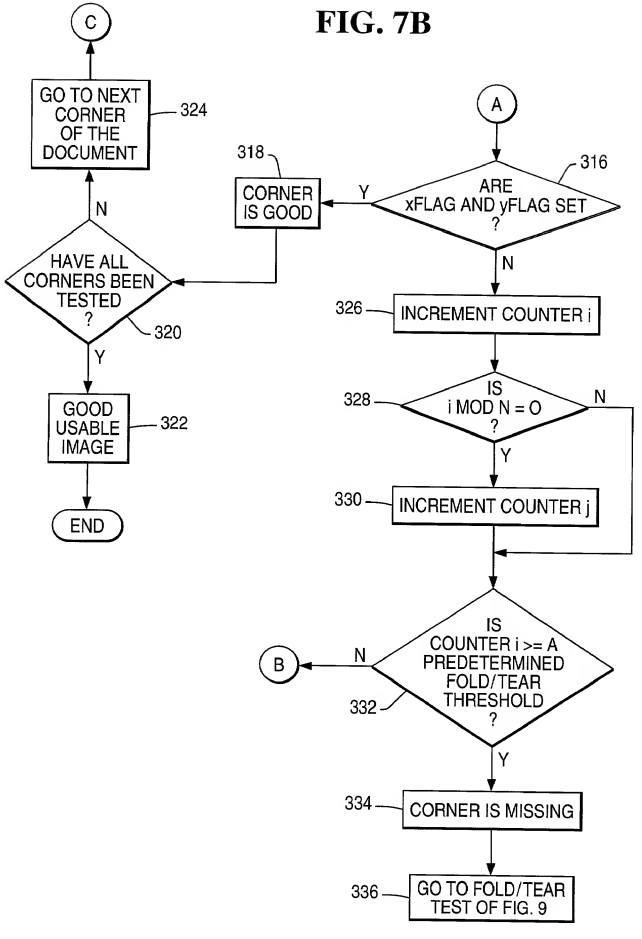

C
GO TO NEXT CORNER OF THE DOCUMENT
324
N
HAVE ALL CORNERS BEEN TESTED ?
320
Y
GOOD USABLE IMAGE
322
END
318
CORNER IS GOOD
Y
A
316
ARE xFLAG AND yFLAG SET ?
N
326
INCREMENT COUNTER i
328
IS i MOD N = O ?
N
Y
330
INCREMENT COUNTER j
B
N
IS COUNTER i >= A PREDETERMINED FOLD/TEAR THRESHOLD ?
332
Y
334
CORNER IS MISSING
336
GO TO FOLD/TEAR TEST OF FIG. 9

FIG. 8

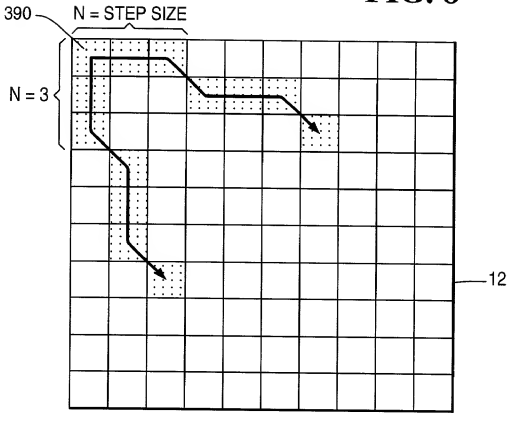
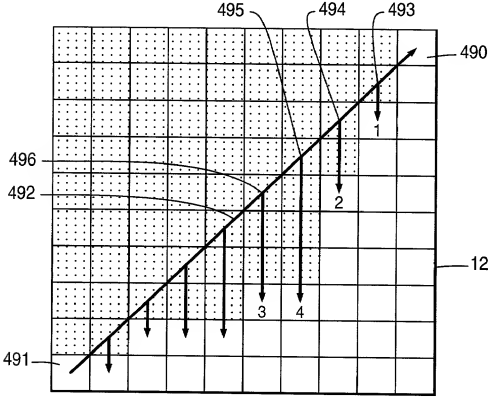


FIG. 10



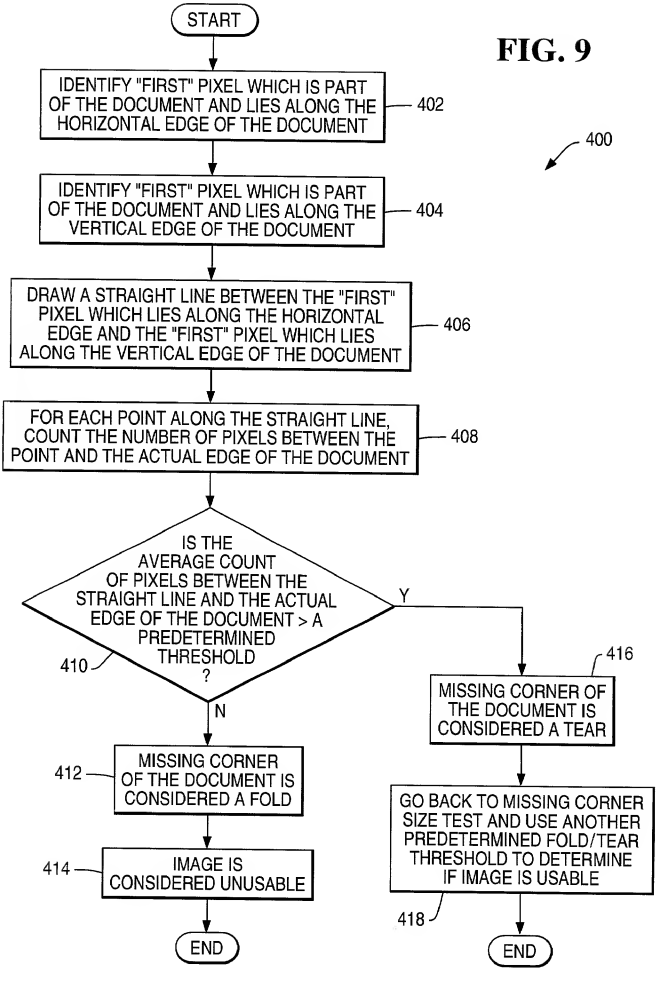

START
IDENTIFY "FIRST" PIXEL WHICH IS PART OF THE DOCUMENT AND LIES ALONG THE HORIZONTAL EDGE OF THE DOCUMENT
402
400
IDENTIFY "FIRST" PIXEL WHICH IS PART OF THE DOCUMENT AND LIES ALONG THE VERTICAL EDGE OF THE DOCUMENT
404
DRAW A STRAIGHT LINE BETWEEN THE "FIRST" PIXEL WHICH LIES ALONG THE HORIZONTAL EDGE AND THE "FIRST" PIXEL WHICH LIES ALONG THE VERTICAL EDGE OF THE DOCUMENT
406
FOR EACH POINT ALONG THE STRAIGHT LINE, COUNT THE NUMBER OF PIXELS BETWEEN THE POINT AND THE ACTUAL EDGE OF THE DOCUMENT
408
IS THE AVERAGE COUNT OF PIXELS BETWEEN THE STRAIGHT LINE AND THE ACTUAL EDGE OF THE DOCUMENT > A PREDETERMINED THRESHOLD ?
410
Y
N
MISSING CORNER OF THE DOCUMENT IS CONSIDERED A TEAR
416
MISSING CORNER OF THE DOCUMENT IS CONSIDERED A FOLD
412
GO BACK TO MISSING CORNER SIZE TEST AND USE ANOTHER PREDETERMINED FOLD/TEAR THRESHOLD TO DETERMINE IF IMAGE IS USABLE
418
IMAGE IS CONSIDERED UNUSABLE
414
END
END

FIG. 9